STUDENT LEARNING MANAGEMENT SYSTEM

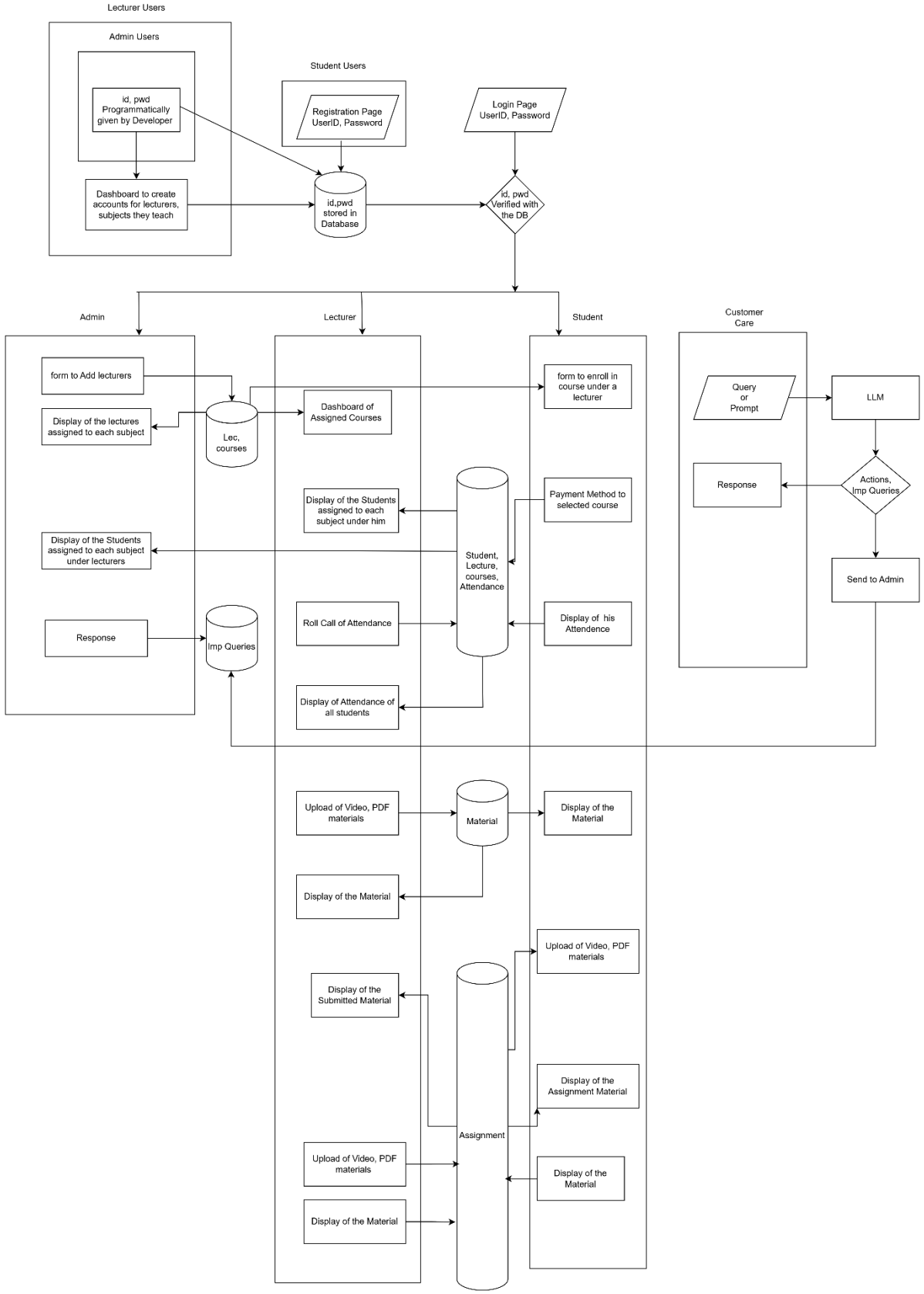
Deliverable-2

TEAM: Group_4

CSCE 5430 Section-400 Software Engineering

Table of Contents

1 Diagram:



Parallelograms – Inputs in the Web UI.
Rectangles – process
Cylinders – Entities in the Database

1.1 Description:

Students use (Register) their Student accounts for account creation yet the Admin gives exclusive access through direct code assignment. The administrator creates new Instructor Accounts through their administration privileges. Students along with Instructors can perform profile updates after completing their login procedure.

The Admin assigns courses to the Instructor through the Account form allowing the Instructor to determine student distribution among his courses but student enrollment happens only after the payment process for open seats.

The lecturers upload materials that students together with instructors can view through their downloaded screens.

The lecturer introduces Assignments to the system which generates answers for student users but the AI system provides correction feedback with similarity levels on selected descriptive Assignments at the lecturer's discretion.

The instructor receives the roll call attendance form that leads to updating the attendance records.

The customer care is an LLM application based chatbot that performs two functions by answering user questions and locating necessary actions which sends admins notifications.

2 Functional Requirements:

2.1 User Management

- The application enables students, instructors and administrators to establish new accounts in addition to account maintenance functions.
- Role-based access control for different user types.

2.2 User Profile Update

- Users have the ability to modify their profile by adding their user information.
- Private and Public mode for user Information.

2.3 Course Management

- The administrative user has full control to create courses together with editing or removing existing courses from the system.

Students can both register for courses and use their course content materials.

2.4 Recommended Courses for Specialization

- Customized Student Recommendation System

2.5 Professor Recommendation System

- Assessments of professor performance take place through Spot Evaluation method**.**

2.6 Payment & Subscription Management

- Users will have the capability to use the platform for paid classes and active subscriptions.

2.7 Content Management

- Professionals can upload different types of multimedia content including videos PDFs quizzes and other items.
- Students receive the option to download all course materials.

2.8 Assignment

- Allow instructors to create assignments.
- Through this system students should have the ability to perform online submission of their assignments.

2.9 Assessment

- The system offers two types of quiz questions which include MCQ (jumbled choices) alongside True or False options.
- The system enables instructors to use Similarity Search for descriptive question correction.

2.10 RAG Implementation for Descriptive Questions

- The system retrieves information from educational PDF documents.
- Transforming data into Vectors
- Loading into the Vector Database2.11 Assessment Creation

2.11 Assessment Creation

- Form for lecturer to create quiz and Descriptive questions

2.12 Grading System

- Auto-grade multiple-choice quizzes.
- Allow manual grading with feedback for assignments or cosine similarity.

2.13 Attendance Tracking

- Track student attendance for live sessions.
- Generate attendance reports.

2.14 Discussion Forums & Chat

- Enable student-instructor and peer discussions.
- Provide real-time messaging for better collaboration.

2.15 Progress Tracking & Reports

- Generate student progress reports and analytics.
- Allow students to track their own progress.

2.16 Feedback & Survey System

- Collect student feedback on courses and instructors.
- Provide analytics on survey responses.

2.17 Customer Care

- LLM-based customer service

2.18 Notifying Actionable to Admin

- Identify actionable queries and report them to the admin.

3 Non-Functional Requirements:

3.1 Performance

- The system should support **at least 1,000 concurrent users** without degradation.

3.2 Scalability

- The LMS should be **easily scalable** to accommodate more students and courses as needed.

3.3 Availability

- The system should have to ensure uninterrupted access to learning materials.

3.4 Security

- Implement **role-based access control (RBAC)** and **data encryption** for user data protection.

3.5 Reliability

- The LMS should **recover automatically** from system failures and backup data every 24 hours.

3.6 Usability

- The interface should be **intuitive and user-friendly** for students, teachers, and admins.

3.7 Maintainability

- The system should allow **easy updates and bug fixes** without downtime.

3.8 Compatibility

- The LMS should work on **all major browsers (Chrome, Firefox, Safari, Edge)** and mobile devices.

3.9 Response Time

- Page loads should take **less than 3 seconds**, and course videos should buffer smoothly.

4 Interfaces of a Student Learning Management System (SLMS)

The SLMS makes contact with external applications and multiple user groups through its interfaces. Different interfaces enable seamless communication between users and system components and also external applications.

4.1 User Interfaces (UI)

The system allows users at every level (students administers and instructors) to connect with its functionalities through its interfaces.

A. Student Interface

The student dashboard shows courses they have enrolled in together with notifications and upcoming deadline information and recent system activities.

Through the Course Page students can access their course materials for discussion participation as well as monitor their progress.

Through the assignment submission tool students can upload their work while taking quizzes to gain grades on it.

Through Profile Management tool students can maintain their information database while reviewing their academic documents.

- Messaging: Provides communication with instructors.
- Discussion Forums: Supports peer collaboration and instructor-led discussions.

B. Instructor Interface

The interface supports instructors to build courses while permitting them to manage and remove course components.

Through this feature instructors can add educational elements such as videos and other files including PDFs and slides and assignments.

Through this system administrators access the capability to generate and assess assignments alongside quizzes and provide performance feedback.

The system provides performance analytics which generate reports about student achievement tracking.

- Communication Tools: Includes messaging, announcements, and discussion forums.
- Gradebook: Allows entry and modification of student grades.

C. Administrator Interface

The application lets administrators perform all functions related to student and instructor administration including student addition and removal and instructor management.

- Course Management: Enables creation, modification, and deletion of courses.
- The application delivers reporting features alongside analytics tools to create performance metrics reports about student usage engagement statistics.

4.2 External System Interfaces (APIs & Integrations)

The system interfaces permit the SLMS to connect with outside applications as well as services beyond its primary functions.

A. Student Information System (SIS) Integration

- Through Data Sync the system performs simultaneous operations and imports various student information including enrollment records and academic records.
- Authentication Integration: Institutional login credentials.

B. Cloud Storage and File Sharing

- The system enables users to synchronize and retrieve training materials stored through both Google Drive and OneDrive.
- By using this function users maintain real-time document synchronization.

4.3 System-to-System Interfaces

This system functionality connects various internal system elements for communication purposes.

A. Database Interface

- The database system based on NoSQL technology stores information about course materials and student records as well as grades and log data.
- Data Query API: Enables secure retrieval and storage of student performance data.

5 Development Phases:

5.1 Phase 1: Core Functionalities (MVP Development)

Objective: Establish a functional platform with essential features for user management, course management, and basic assessments.

1.User Management

- Student, Instructor, and Admin account creation & management
- Role-based access control

2. User Profile Update

- Profile editing options
- Private and Public mode for user information

3. Course Management

- The platform includes functions from Admin users to generate courses and administer course creation and modification and deletion processes.
- Students: Enroll in and access course materials

4. Assignment System

- Instructors create assignments
- Students submit assignments online

5. Assessment

- Basic quiz functionality (MCQs & True/False)
- Auto-grading for MCQs

6. Grading System

- Auto-grade MCQs
- The system uses manual grading processes for descriptive responses while providing feedback to students.

7. Progress Tracking & Reports

- Basic student progress tracking

8. Customer Care

- LLM-based customer service for common queries

5.2 Phase 2: Advanced Learning Features

The main goal focuses on developing personalized recommendation systems with improved assessment tools supported by interactive enhancements.

9. Recommended Courses for Specialization

- The system will create student recommendations that depend on the courses students have enrolled in.

10. Professor Recommendation System

- Educational data should receive evaluation scores based on the assessments from students in class.

11. Payment & Subscription Management

- Pay-training courses and the option to subscribe to programs are available through this platform.

12. Content Management

- The system enables users to upload along with organizing various multimedia platform content including videos PDFs and quizzes.
- Provide downloadable course materials

13. Assessment Enhancements

- Jumbled quiz questions for MCQs
- The system analyzes descriptive questions through similarity search methods for evaluation.

14. Attendance Tracking

- Track attendance for live sessions
- Generate attendance reports

15. Feedback & Survey System

- Collect student feedback on courses and instructors

5.3 Phase 3: AI-Powered Enhancements & Automation

The solution aims to use AI-based automation systems for evaluation tasks including assessment grading and administrative procedures.

16. RAG Implementation for Descriptive Questions

- Extract information from course material PDFs
- Transform data into vectors
- Load into a vector database for similarity-based evaluation

17. Grading System Enhancement

- AI-based auto-grading using cosine similarity for descriptive questions

18. Advanced Progress Tracking & Analytics

- The platform creates elaborate reports which benefit both student users and instructor users.

6. Member contribution table

Member name	Contribution description	Overall Contribution (%)	Note (if applicable)
Sadvik Kondadi	Functional Requirements	11%	
Shashank Kodishala	Diagram	11%	
Sai Chandra Teja Akkala	Functional Requirements	11%	
Deeepak Reddy Punuru	Project Development Phases	11%	
Deepu Gondhi	Non-Functional Requirements	11%	
Sanjay Ramaswamy	Documentation of Report, Description of diagram	11%	
Padmaja Soma	Project Development Phases	11%	
Nithin Reddy Pinikesi	Non-Functional Requirements	11%	
Thanwish Ram Pothugunta	System interfaces of SLMS	11%	